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Amendments to the Claims

We enclose herewith an amended set of claims wherein rejected Claims 22, 23, and 25-29 have been canceled and ask that these be substituted for the claims currently on file.

1. (Previously Amended) A method of providing frequency reuse in a communication system, the method including:
   - receiving a plurality of transmission signals with a plurality of receiver elements wherein said plurality of transmission signals are transmitted by a transmitter having a plurality of transmitting elements, the receiver elements capable of providing a plurality of received signals having known ratios of co-channel interference,
   - providing the received signals with algebraically unique ratios of co-channel interference, and
   - separating at least one desired signal from the received signals.

2. (Original) The method of claim 1 wherein the step of providing the received signals with algebraically unique ratios of co-channel interference includes shaping at least one spatial gain distribution of at least one of the transmitted signals.

3. (Original) The method of claim 1 wherein the step of providing the received signals with algebraically unique ratios of co-channel interference includes shaping at least one spatial gain distribution of at least one of the received signals.

4. (Original) The method of claim 1 wherein the step of providing the received signals with algebraically unique ratios of co-channel interference includes at least one of a set of methods including aperture synthesis, beam steering, lensing, and interferometric combining.

5. (Original) The method of claim 1 wherein the step of providing the received signals with algebraically unique ratios of co-channel interference is performed in response

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to a feedback signal from at least one receiver.

6. (Original) The method of claim 1 wherein the receiver elements are spatially separated array elements.

7. (Previously Amended) The method of claim 1 wherein the receiver elements include more than two polarization elements and the co-channel interference includes cross polarization.

8. (Previously Amended) The method of claim 1 wherein the step of providing the received signals with algebraically unique ratios of co-channel interference includes an optimization process wherein the optimization process controls the step of providing the received signals with algebraically unique ratios of co-channel interference.

9. (Previously Amended) The method of claim 8 wherein the ratios of co-channel interference result from spatial gain distributions of the received signals.

10. (Original) The method of claim 9 wherein the spatial gain distribution includes at least one minima in a predetermined spatial region.

11. (Original) The method of claim 9 wherein the spatial gain distribution includes at least one spatial region having at least one predetermined ratio of signal levels.

12. (Original) The method of claim 9 wherein the spatial gain distribution is controlled by directionality of the receivers.

13. (Original) The method of claim 9 wherein the spatial gain distribution is created by an overlap of at least two transmitted signals.

14. (Original) The method of claim 1 wherein the ratios of co-channel interference

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provide weights to a cancellation step that is included in the step of providing separation of the transmitted signals from the received signals.

15. (Original) The method of claim 14 wherein the weights have complex values.

16. (Original) The method of claim 14 wherein at least one of the weights includes a delay element.

17. (Original) The method of claim 14 wherein the weights are frequency-dependent weights, the transmission signals having diverse frequency characteristics.

18. (Original) The method of claim 14 wherein the weights are frequency-dependent weights and the transmission signals have a plurality of signal frequencies.

19. (Previously Amended) A method of bandwidth-efficient communications that achieves frequency reuse, the method including:
   • transmitting a plurality of transmission signals from a transmitter having a plurality of transmitting elements wherein the plurality of transmission signals have at least one common frequency channel,
   • receiving the plurality of transmitted signals with a plurality of receiver elements for providing a plurality of received signals, the received signals having known ratios of co-channel interference,
   • providing the received signals with algebraically unique ratios of co-channel interference, and
   • separating at least one desired signal from the received signals.

20. (Previously Amended) A method of array processing that enables simultaneous frequency use of a plurality of transmitted signals from a transmitter having a plurality of transmitter elements, the method including steps of:
   • determining a plurality of ratios of co-channel interference occurring between the transmitted signals received at each of a plurality of receivers,

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- receiving the transmitted signals at the receivers, the receivers capable of being responsive to the received transmitted signals for providing a plurality of received signals, the received signals having known ratios of co-channel interference,
- providing the received signals with algebraically unique ratios of co-channel interference, and
- separating the transmitted signals from the received signals.

21. (Previously Amended) A method of bandwidth-efficient communications that achieves frequency reuse, the method including steps of:
    - providing transmission by a transmitter having a plurality of transmitter elements of a plurality of transmission signals having at least one common frequency channel,
    - providing determination of a plurality of ratios of co-channel interference occurring between the transmitted signals received by a plurality of receivers,
    - receiving the transmitted signals with the receivers, the receivers capable of being responsive to the received transmitted signals for providing a plurality of received signals having known ratios of co-channel interference,
    - providing the received signals with algebraically unique ratios of co-channel interference, and
    - providing separation of the transmitted signals from the received signals.

22. (Canceled) A method of optimizing separation of a plurality of transmitted signals received by a plurality of receiver elements coupled to a cancellation circuit, the method including steps of:
    - receiving a plurality of transmission signals transmitted in at least one common frequency channel by at least one transmitter having a plurality of transmitter elements, the transmission signals being received by said plurality of receiver elements for providing a plurality of received signals with a plurality of algebraically unique proportions of co-channel interference,
    - providing at least one determination of signal quality for at least one of a plurality of separated signals output by the cancellation circuit,

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- providing at least one feedback signal to at least one transmitter that generates the transmission signals, and

- adjusting at least one transmission parameter to provide adjustment to the algebraically unique proportions of co-channel interference of at least one received signal, the adjustment of the at least one transmission parameter being related to the value of the feedback signal.

23. (Canceled) A method of separating a plurality of received transmission signals transmitted by at least one transmitter having a plurality of transmitter elements adapted to transmit a plurality of signals having co-channel interference, the received transmission signals having known ratios of co-channel interference, the method including:

- receiving the transmission signals with a plurality of receivers capable of providing a plurality of received signals having ~~known~~ algebraically unique ratios of co-channel interference,

- providing weights to a cancellation circuit based on the ratios of co-channel interference, and

- coupling the received signals into the cancellation circuit, the cancellation circuit being capable of separating the received transmission signals.

24. (Withdrawn) A method of determining spatial gain distributions of a plurality of signals received by a plurality of receivers, the method including:

- transmitting at least one known reference signal,

- measuring the at least one reference signal received by each of the receivers for producing a plurality of measurements, and

- determining ratios of co-channel interference from the measurements.

25. (Canceled) In an electromagnetic-wave communication system, a signal canceller capable of separating one or more transmission signals from a plurality of interfering transmission signals transmitted by at least one transmitter having a plurality of transmitter elements and adapted to transmit a plurality of signals having co-channel

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interference, the plurality of signals being received by a receiver having a plurality of receiver elements, the signal canceller adapted to be coupled to the receiver, the signal canceller including:

a frequency filter coupled to the receiver capable of receiving a plurality of the received transmission signals, each of the received signals having an algebraically unique combination of the transmission signals and each of the transmission signals having distributed frequency characteristics, the frequency filter capable of separating each of the received signals into a plurality of received-signal frequency components;

a plurality of weighting elements coupled to the frequency filter, the weighting elements capable of providing a weight to each of the received-signal frequency components to provide a plurality of weighted received-signal frequency components; and

a signal combiner capable of summing the weighted received-signal frequency components to separate the received transmission signals.

26. (Canceled) In an electromagnetic-wave communication system, a signal canceller capable of separating one or more transmission signals from a plurality of interfering transmission signals transmitted by at least one transmitter having a plurality of transmitter elements adapted to generate a plurality of signals having co-channel interference and received by a receiver having a plurality of receiver elements, the signal canceller including:

- a plurality of weighting elements coupled to the receiver capable of receiving a plurality of receive signals from the receiver, each of the receive signals having an algebraically unique combination of the transmission signals, the weighting elements capable of providing at least one weight to each of the receive signals to provide a plurality of weighted receive signals and

- a signal combiner capable of summing the weighted receive signals to separate the interfering transmission signals.

27. (Canceled) In an electromagnetic-wave communication system capable of using interference cancellation to achieve frequency reuse, a receiver capable of separating

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a plurality of received transmission signals transmitted by at least one transmitter having a plurality of transmitter elements adapted to generate a plurality of transmission signals having co-channel interference, the receiver including:

- a plurality of receiver elements capable of sampling the transmission signals, the receiver elements capable of being responsive to the transmission signals for generating a plurality of receive signals wherein each of the receive signals includes an algebraically unique combination of the transmission signals and

- a canceller coupled to the receiver elements capable of separating one or more of the received transmission signals.

28. (Canceled) The receiver of claim 27 wherein the plurality of receiver elements is an antenna array that includes a plurality of antenna-array beam processors, the receive signals being output from each of the processors.

29. (Canceled) In an electromagnetic-wave communication system, a receiver capable of receiving a plurality of algebraically unique proportions of more than two differently polarized transmission signals transmitted by at least one transmitter adapted to generate a plurality of transmission signals having co-channel interference, the receiver adapted to separate at least one of the received transmission signals, the receiver including:

    a plurality of polarized receiver elements capable of having different polarizations, each of the receiver elements capable of having a different responsiveness to the differently polarized transmission signals for generating a plurality of receive signals wherein each of the receive signals includes an algebraically unique combination of the transmission signals, and

    a canceller coupled to the receiver elements capable of receiving the receive signals and separating one or more of the received transmission signals therefrom.